Minimum BMP Requirement Matrix (Revised 2/15/12)

BMP Matrix Manage Receptor Exposure			Disturbance By Hand Methods [III]	Disturbance By Mechanical Methods	
			All Receptors [I]	Regulated Work Area Receptor [I]	Adjacent Receptor (0-105' - distance to be further evaluated) [I]
Material Condition	**Material Friability**		**BMP**	**BMP**	**BMP Incremental Addition for Adjacent Receptor**
Damaged (has been or will be broken)	**Non-Friable or fibers in soil (that has not and will not be rendered friable)**	BMP 1	B, C, D, F	B, C, D, F	E
		BMP 2	A, E	A, B, E	C
		BMP 3	A, B	A, B, C, D	
		BMP 4	-	A, C1, C2	
		BMP 5	-	-	A, B, D, E, F
		BMP 6	A, B, C[II], D, E	A, B, C[II], F, G	
		BMP 7	A, B, D, E	A, B, D, E	
		BMP 8	A, B	A, B	
		BMP 9	C, D	A, B, C, D	
		BMP 10	A, C	A, C	B
Visible Friable		BMP 1	B, C, D, F	B, C, D, F	A, E
		BMP 2	A, E	A, B, C, E	(D)
		BMP 3	A, B	A, B, C, D	
		BMP 4	-	A, C1, C2	B
		BMP 5	-	-	A, B, C, D, E, F
		BMP 6	A, B, C[II], D, E	A, B, C[II], F, G	
		BMP 7	A, B, C, D, E	A, B, C, D, E	
		BMP 8	A, B	A, B	
		BMP 9	C, D	A, B, C, D	
		BMP 10	A, C	A, C	B

[I] The categories across the top of this table are not mutually exclusive and may be additive (i.e. there may be a combination of the above at any given site)

[II] For facility component removal

[III] For the purposes of this BMP Matrix hand removal applies to removal with a shovel or other hand held tools

( ) = optional; comma = and; - = NA

These Requirements do not preclude the necessity to comply with any and all other applicable federal, state or local requirements.

BMP1 Training

A) Community/ancillary worker awareness
B) Asbestos-contaminated soil awareness training (for general contractor and those not planned to disturb ACS, but have the potential to)
C) Soil disturbance training (8 hour training) (for everyone actively engaged in disturbing ACS)
    1) Soil identification
    2) Background of asbestos
    3) Health effects
    4) Current regulation awareness
    5) Worker protection
    6) Decontamination/cross contamination
    7) Engineering controls
    8) Specialized work practices
    9) Handling
    10) Chain of command
D) CO Certified Asbestos Building Inspector with 40 hours of on the job asbestos in soils experience on a minimum of 3 different asbestos in soils jobs (jobs may be either Reg. 8 asbestos in soils or Section 5.5 asbestos in soils)
E) CO Certified Air Monitoring Specialist (AMS)
F) Authorities (a=stop work, b=waste classification, c=bmp compliance, d=QA)
    1) Owner/operator: (a, b, c, d)
    2) General contractor: (a, b, c)
    3) Remediation/abatement contractor: [a, ((c) as applicable)]
    4) CABI independent from GC or abatement contractor: [(c)as applicable]
    5) Tier II subcontractors: (n/a)
    6) Transporter: (n/a)

BMP2 Establishment of a Regulated Work Area (RWA)

A) Establish a RWA which is identifiable to all persons
B) Post labeling and signage to demarcate RWA
C) Establish a secured work site (fencing/locks)
D) Establish protection of adjacent structures
E) Stop all soil disturbing activities in RWA if non-OSHA personnel or public are present

BMP3 Wetting

A) Pre-wetting of surface soil to minimize emissions from initial disturbance
B) Application of water to achieve adequately wet levels as defined in Section 1.2 of the Solid Waste Regulations
C) Use of amended water as wetting agent
D) Equipment mounted spray bars, or additional hose operator(s) to provide continuous misting through the placement of ACS

BMP4 Wind Speed Monitoring

A) Measurement of wind speeds at a minimum of 30 minute intervals and during wind gusts
B) Wind break barriers
C) Wind speed shutdowns for:

1) Excess of 20 mph gust or sustained winds of 12 mph over 10 minutes (with resume work conditions as no gusts >20 mph for 20 minutes, no sustained winds >12 mph for 20 minutes,
2) Wind is interfering with the ability of engineering controls to function as intended (with resume work conditions as winds are no longer interfering with ability of engineering controls to function as intended)

BMP5 Air Monitoring (to demonstrate effectiveness of BMPs, not for risk evaluation)

A) For 2 day or less projects, no air monitoring is required
B) Area Monitoring - four compass points around soil disturbing activity with additional samples for large perimeter work area (greater than 1 acre). Monitoring to add an additional one sample for every 200 linear feet (or approximately each additional ¼ acre)
C) Two downwind floaters – to be moved based on prevailing wind direction
D) PCM analysis – required on all sampling. The laboratory should be directed to provide verbal results by the start of the next working day, or as soon as possible after the start of the next working day, with written results within 24 hours of the receipt of verbal results
E) TEM analysis(presence/absence, counts optional) – The laboratory should be directed to provide verbal results by the start of the next working day, or as soon as possible after the start of the next working day, with written results within 24 hours of the receipt of verbal results
    1) First five (5) days of soil disturbing activity – A minimum of 25% analysis by TEM on highest PCM(s) based on fiber concentration. If all samples are Below Detectable Limit (BDL) for fiber concentration then the 25% will be determined by highest fiber counts. If all samples have no fiber counts then no TEM analysis is required
    2) After first five (5) days of soil disturbing activity and no TEM detections – 25% analysis by TEM on highest PCM(s) once every five (5) days using the same procedures as above
    3) If there are any detections during the random once every five days analysis by TEM, then TEM analysis shall be conducted for three (3) consecutive work days using the same procedures as above
    4) Any PCM samples with fiber concentrations greater than 0.01 f/cc shall be analyzed by TEM
F) Detection responses
    1) Notify CDPHE verbally or by email, within 24 hours, of receipt of results from lab (verbal or written results)
    2) Evaluate site conditions and engineering controls for each detection.
    3) Submit an Emission Control Plan (ECP) to the Division for each detection (days with multiple detections can be addressed by a single ECP). The ECP shall be submitted within 48 hours from the fiber detection event and shall contain:
        a. The date of the detection
        b. A written description of sample details (sample ID, number of structures detected, type of asbestos detected, PCM analytical result) and any potential cause of the release. Include a description of site activity (engineering controls being employed, equipment being used, size of excavation/soil disturbing activity, types of materials encountered, etc.) and CABI observations at the work area before and during the presumed time of release
        c. Include a diagram or write up of all air sample positions clearly indicating which sample received the TEM detection. Indicate, through illustration or description, prevailing wind direction and average wind speeds for the detection event (to include any wind speed shutdowns for the date of detection). If applicable, indicate through illustration or description downwind floater air sample relocation times and
        d. new positions
        e. Attach laboratory reports confirming the type and amount of fibers detected by TEM analysis

f. Include any other pertinent information that will additionally describe the release and/or will assist in the prevention of future releases
g. A written description of proposed actions to prevent future releases

4) If there are 3 TEM detections on consecutive analysis events or 10 detections for a single project, consultation with CDPHE to determine if the best applicable BMPs are being applied and whether;
   a. Changes in BMPs are likely to prevent future releases.
   b. Changes in BMPs are not likely to prevent future releases and a SCMP is necessary per Section 5.5.4 (B) 1
   c. Fibers appear to be coming from offsite and not under the control of the owner/operator
      i. In addition to the information provided in the ECP, demonstration must be provided documenting possible additional sources of asbestos fibers

BMP6 Soil Disturbing Activity Work Practices

A) Stabilize ACS and soil containing ACM for exposed face or soil piles
   1) Polyethylene sheeting or geotechnical fabric with daily inspection (and after storm events) and repair/replace as necessary, or
   2) Chemical stabilizer demonstrated to be effective in the stabilization of ACS (e.g. magnesium chloride) w/ weekly inspection (and after storm events) and re-application as necessary, or
   3) Clean soil cover (minimum 3"), or
   4) Stabilization not required if soils are kept adequately wet and additional soil disturbance is planned within 12 hours

B) No visible emissions (outside the RWA)
   1) Excavate in lifts not to exceed wetting or,
   2) Continuous wetting while mixing dry materials at the point of excavation to ensure all materials are adequately wet prior to removal from the excavation
   3) Instances of emissions leaving the work area must be noted and addressed

C) Removal of asbestos from a facility component or removal of an asbestos containing facility component that is less than the Reg. 8 trigger levels using work practices in accordance with APCD Reg. 8 Section III.V.

D) Hand removal from ground surface with:
   1) Wetting and removal of 1ft.^{3} of surrounding soil
   2) CABI confirmation that visual extent of ACM and surrounding soil has been removed (or extent of excavation has been reached); if visible ACM remains, it must be managed as ACS (for stabilization or future removal)
   3) Single bag non-friable materials and associated soils or double bag friable materials and associated soils, and dispose of materials properly in accordance with BMP 9

E) In-situ hand removal from sub-surface of a single location pocket:
   1) Removal of pocket of ACM and associated soil (additional 6" in the direction of planned soil disturbance) with visual confirmation
   2) CABI confirmation that visual extent of ACS has been removed; if visible ACM remains, it must be managed as ACS (for stabilization or future removal)
   3) Single bag non-friable materials and associated soils or double bag friable materials and associated soils, and dispose of materials properly in accordance with BMP 9

F) Mechanical removal of all visible materials and a minimum of 6" for surface removal or 3 linear feet for subsurface removal in the direction(s) of planned excavation with CABI confirmation that the visual extent of ACS has been removed; if visible ACM remains, it must be managed as ACS (for stabilization or future removal)

G) Handling

1) Loading
    a) Protection of clean surfaces by covering, or decontamination of surfaces prior to demobilization or removal of equipment from the work area
    b) Spill prevention and response:
        i) Minimize spillage by not overfilling excavator or loader bucket and returning to a closed position prior to moving from the loading point
        ii) Spilled material shall be cleaned up immediately and not allowed to dry out or accumulate
        iii) Protective coverings shall be replaced when worn or damaged to prevent breaches
        iv) Removal of a minimum of 3" of soil from beneath breached coverings where ACS or water contaminated with asbestos may have impacted soil below the covering; visual confirmation of the 3" removal
    c) During the process of loading the container, the equipment operator should lower the bucket as close as possible to the interior of the container before dumping, and dump the load slowly to allow adequate misting and to prevent emissions
2) Staging (staging piles are piles that will exist for 12 hours or less):
    a) Clean staging with incidental discovery
        i) If CABI was continually inspecting during generation, remove the piece of ACM and 1 foot in all directions
        ii) If CABI was not continually inspecting during generation, conduct intrusive inspection of the pile to determine the extent of contamination and remove the visual extent of contamination plus 1 foot in all directions, or remove the entire pile as ACS
    b) Contaminated material staging on 10 mil polyethylene sheeting or removal of a minimum of 3" of soil from below staging pile/area prior to demobilization; with visual confirmation of the 3" removal

BMP7 Personal Protective Equipment

A) Disposable booties or impermeable footwear
B) Disposable or impermeable gloves
C) Tyvek® suits or equivalent coveralls
D) Replace all PPE as necessary to prevent contamination from leaving the RWA via cross contamination
E) Decontamination (per BMP 8) or disposal of all used PPE as asbestos contaminated waste

BMP8 Decontamination

A) Personnel decontamination
    1) Remove booties and/or gloves before exiting RWA, or
    2) Boot wash station with collection of rinsate and filtration to less than 5 microns (or applicable local requirements) and discharge to a sanitary sewer or re-application to ACS

    If applicable (if BMP 7C is required),

    3) Remove Tyvek® before exiting RWA, or
    4) Full wet decontamination prior to exiting RWA with collection of rinsate and filtration to less than 5 microns and discharge to a sanitary sewer (re-application of decontamination. shower water prohibited)
B) Equipment or surface decontamination
    1) Keep all equipment off of ACS, or
    2) Protection of clean surfaces by covering with polyethylene sheeting with cleaning, repair, or replacement of coverings as necessary, or

    For equipment that comes into contact with ACS:

3) Wet decontamination on a decontamination pad (minimum 10 mil poly) with collection of rinsate and/or runoff for filtering to 5 microns and
4) disposal into a sanitary sewer or re-application to ACS, and/or HEPA vacuums; CABI inspection and verification of equipment before it leaves the decontamination area,
5) For onsite moving of equipment only, soil sampling may be used to determine asbestos content of soil on equipment, however moving equipment offsite requires full decontamination and CABI verification that all potential ACS has been removed from the equipment

BMP9 Soil Disposition (stockpiling, reuse, transportation, and disposal)

A) Stockpiling (stockpiles are piles that will exist for more than 12 hours)
   1) Stockpiled soils must be placed on a minimum of 6 mil polyethylene sheeting or soils must be excavated to a minimum depth of 3" under the entire area of ACS stockpiles after stockpile removal
   2) Utilize wet methods during the placement and disturbances of soils
   3) Secure stockpiles as per BMP 2
   4) Perform stabilization of soils as per BMP 6A
   5) Maximum length of storage of any stockpile onsite shall not exceed 10 working days
   6) Disturbance of stockpile in accordance with BMP 5 and BMP 6 B and G
   7) For a soil stockpile that was previously thought to be clean but contamination is found, intrusively inspect the pile to determine the extent of contamination and remove the visual extent of contamination plus 1 foot in all directions, or remove the entire pile plus an additional 3" in accordance with BMP 9 A 1
B) Reuse
   1) Onsite –
      a) Outside of area of contamination = beneficial reuse with cover (18" soil and vegetation, 6" of soil plus concrete or asphalt. Alternate cover designs must come in an approved work plan = exit from BMP approach. (Covenant requirements TBD)
      b) Inside the area of contamination = same cover requirements as in a), (covenant requirements TBD)
   2) Offsite –
      a) unrestricted reuse of material demonstrated through sampling
      b) restricted reuse = disposal (see BMP 9 D below)
C) Transportation
   1) Onsite - no liners required; decontamination per BMP 8
   2) Offsite - liners as required per Section 5.5.7 of Regulation
D) Disposal
   1) Onsite - requires D&O Plan; CD if applicable; covenant, EXIT BMPs
   2) Offsite - per Section 5.5.7 of Regulation in a permitted landfill or creation of a new landfill with same requirements of BMP 9 D 1, EXIT BMPs

BMP10 Documentation requirements (to be maintained during a project and available for Department review upon request; this documentation need not be submitted to CDPHE unless requested) (CABI and AMS notes may be collected by one individual if they possess both certifications, however, if no AMS is onsite (no air monitoring required) it may be necessary for the CABI to provide items listed in the AMS notes section (e.g. wind monitoring and shutdown events). Other appropriate personnel may also provide the following documentation.

A) CABI Notes – Site description including location, Descriptions of: site activities, equipment in use, hand removals (including locations), types of debris encountered, suspect material encountered, friability of ACM encountered, any sampling if conducted, visual clearances for decontamination(s), visual clearances of

excavation(s), observations of visible emissions and responses, non-earthen material or the appearance of fill, or other indicators of impact to soils

B) AMS notes – wind speed measurements, prevailing wind direction(s), wind shut down event(s), initial air sample locations, air sample relocation notes, observations of visible emissions and responses, notes pertaining to sample malfunctions (pump faults, overloading, etc.), air sample data (flow rates, time of sampling, volumes, calibration method, etc.)

C) General documentation containing: disposal records, analytical reports, locations of remaining ACS, dates of stockpile creation and removal